

# Hall C

Mark Jones , Hall C Staff

## Overview

- Most experiments will use the existing High Momentum Spectrometer (HMS) and the new Super High Momentum Spectrometer (SHMS).
- HMS and SHMS have similar detector packages: Drift Chambers, Scintillator hodoscopes, gas Cerenkov, Aerogel, Lead-glass calorimeter.
- Several experiments use new apparatus: neutron polarimeter, neutral meson spectrometer, Backward angle hodoscope third arm.

## Status and Timeline

- SHMS carriage is on the pivot and detector hut is being constructed.
- Magnets being built. Installed in late 2014 thru 2015.
- Beam commissioning in Feb 2016 (Shift from April 2015)

# Goals and Management Structure

## Goals of Hall C Software

- Develop a Hall C specific standalone C++ library that utilizes the existing Hall A PODD C++ library. Use the existing well-tested Fortran code (ENGINE) as basis for the C++ library.
- Test new HMS code against original Fortran code (ENGINE) using 6 GeV HMS data
- Test new SHMS code against original Fortran code (ENGINE) using 6 GeV SOS data

## Management Structure

Activity	Person	Institute
Software Manager	Mark Jones	Jefferson Lab
C++/ROOT Analyzer	Gabriel Niculescu	James Madison University
Calibrations	John Arrington	Argonne National Lab
Online histogramming	Pete Markowitz	Florida International Univ.
Simulation (SIMC)	David Gaskell	Jefferson Lab

# HMS and SHMS comparison

HMS detector	SHMS detector	Comment
Front X-Y scintillator plane Rear X-Y scintillator plane	Front X-Y scintillator plane Rear X scintillator plane Rear Y quartz plane	Same code Same code New code
Drift Chamber	Drift Chamber	Modified code for SHMS Based on Hall C SOS DC design
Gas Cerenkov	Noble Gas Cerenkov Heavy Gas Cerenkov	Same code
Aerogel	Aerogel	Same code
Lead Glass Calorimeter 4 columns oriented perpendicular to central ray	Pre Shower Column “Fly’s Eye” Arrangement of Calorimeter	New code. SHMS is similar to Hall A Calorimeter

# Present Status

- HMS Drift Chamber tracking code is working and comparisons to Fortran analyzer have been done. Need to add best track selection and tracking efficiency code.
- Now with tracking done, HMS hodoscope and calorimeter coding and comparisons can be finished.
- HMS gas cerenkov and aerogel comparisons in progress.
- Using git for version control and Github as repository server. Github is easier for offsite users and has tools for communication and tracking issues and milestones.
- Added the ability to use SCONS for building code to eventually replace Make. Makes it easier to build on different platforms.
- Documentation on Hall C wiki to allow users to get involved.
- Integrating Hall C scalars into PODD.
- Adding Hall C report templates.

# Progress on Milestones

2012

July : Define reference HMS data for testing code

- Using data from “Jan05” experiment

Sep : Documented non-tracking HMS detectors code in Fortran Analyzer

- Calorimeter done
- Hodoscope partly done
- Aerogel, Gas Cerenkov almost done

Oct : Make DAQ decoding in C++ Analyzer object-oriented

- Has been started by Bob Michaels in Hall A

Oct : Ability to analyze Hall C data at the raw data level in C++ Analyzer

- Done

Dec : Documented the drift chambers and tracking code in Fortran Analyzer

- Not done

Dec : Verify HMS hodoscope analysis in C++ Analyzer

- Done (as far as could be without tracking)

# Progress on Milestones (part 2)

2013

Jun : SHMS code added to Fortran Analyzer.

- Not done
- Decide not to do since expecting beam to Hall C in 2016

July : Full analysis of HMS data with C++ Analyzer ready

- Not done
- Drift Chamber tracking code ready.

Sep : C++ Analyzer ready for SHMS calorimeter tests.

- Not needed

Dec : Full analysis of HMS data with C++ Analyzer verified by comparison to Fortran analyzer.

- Will postpone

# Updated Milestones

2014

Jan: Hall C specific BPM/Raster code. Hall C report templates

Mar: Implement Hall C scalers.

June: Complete documentation of Fortran code.

July: HMS Calibration codes ready.

Aug: HMS Online histogramming ready

Oct: Test software for SHMS calorimeter with FADC.

Dec : Full analysis of HMS data with C++ Analyzer verified by comparison to Fortran analyzer.

Dec: Nightly builds

2015

June: C++ Analyzer ready for SHMS detector package

June: SHMS Online histogramming ready

Aug: SHMS Calibration codes ready.

Sept : Analyze cosmic ray data in SHMS

# Summary

## Response to recommendations

- Not developing SHMS Fortran code.
- Plan on nightly builds by Dec 2014
- Investigating use of code evaluation codes such as `cpp_check` and `valgrind`

## Afternoon talks:

- “Comparisons between HCANA and ENGINE”,  
Gabriel Niculescu, JMU
- "Hall C General Updates and additions to PODD“,  
Ed Brash, CNU